UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

JUN - 7 2017

REPLY TO THE ATTENTION OF:
LU-16J

VIA ELECTRONIC MAIL AND
CERTIFIED MAIL 70163010000073490409
RETURN RECEIPT REQUESTED

Carl J. Coker
The Dow Chemical Company
Environmental Remediation and Restoration
310 George Patterson Boulevard, Suite 100
Bristol, Pennsylvania 19007

Re: Follow up to March 14, 2017, Meeting and Next Steps
Former Rohm and Haas Chemicals, LLC Facility
U.S. EPA ID No. OHD 000 724 138
Administrative Order, RCRA Section 3013, Docket Number: R3013-5-00-001

Dear Mr. Coker:

This letter serves as a complement to our letter of April 5, 2017, in which we briefly summarized discussions and results from our March 14 meeting. We would again like to thank the Dow Chemical Company (Dow) for attending the meeting to share and discuss information and data from the former Rohm and Haas Site (Site). At the meeting, we discussed Dow's most recent submission of the 2016 Site-Wide Groundwater Sampling Report and additional work necessary to complete corrective action at the Site. We agreed we would provide Dow with the additional information or clarification the United State Environmental Protection Agency (EPA) considers necessary to complete an environmental characterization of the Site. We also agreed to provide further direction regarding the next steps in corrective action needed from Dow.

As such, this letter identifies information and clarification needed pertaining to characterization of the Site pursuant to the Administrative Order (AO) under Section 3013 of the Resource Conservation and Recovery Act, Docket Number R3013-5-00-001. This letter also identifies next steps for achieving completion of corrective action at the Site. For the purpose of this letter, EPA has reviewed the results from the 2016 Site-Wide Groundwater Sampling Report and other data that Dow and its predecessors have previously reported to EPA under the requirements of the AO.

We most recently revised the draft figure entitled "Potential Institutional Controls" to clarify the legend. The revised figure was dated April 18, 2017, and sent to you via email on the date

following the figure's revision. We are also including a copy of the revised figure for your reference.

As we have also expressed to Dow, we continue to work with QGPOH to facilitate site redevelopment while ensuring appropriate management of environmental risk from residual contamination at the Site.

Next steps for completion of corrective action at the Site are guided by the characterization data and analysis completed to date. Highlights of these results and analysis are shown below.

a) Concentrations for several inorganic and organic chemicals in the upper aquifer exceed drinking water and surface water protection criteria, including volatile organic compounds (VOCs), semi-volatile compounds (SVOCs) and metals. Concentrations of several VOCs exceed screening levels for vapor intrusion in shallow groundwater. Contamination in groundwater at the Site has not extended to the lower aquifer.
b) Based on regulations from the Ohio Environmental Protection Agency, concentrations of chemicals in groundwater must meet Water Quality Criteria (WQC) at the groundwater to surface-water interface in Mill Creek.
c) The northwest area of the site is associated with elevated concentrations of VOCs, SVOCs and metals in groundwater from the shallow upper aquifer. Groundwater monitoring wells within this area include MW-EPA-1, UAW05-20, UAW06-20, UAW07-20 and UAW08-20. For example, the 2016 data showed that the concentration for chlorobenzene at well MW-EPA-1 was 5200 micrograms per liter (µg/l), the concentration for aniline was 180 µg/l at well UAW-08-20, and the concentration for total chromium in well UAW-05-20 was 4,500 µg/l. Concentrations of some VOCs and metals in wells from the shallow upper aquifer located in the eastern and central portion of the Site have also exceeded WQC.
d) Operation of the groundwater extraction system was discontinued for a time at the Site and then resumed on or about January 14, 2017. The above-described exceedances in groundwater have occurred with the groundwater extraction system being operational. EPA has concern that the groundwater contamination in the shallow upper aquifer at the groundwater-to-surface water interface for Mill Creek does not meet WQC for protection of surface water prior to discharge to Mill Creek.
e) Concentrations of some VOCs and metals in the lower portion of the upper aquifer have the potential to migrate off-site at concentrations above drinking water standards. For example, the 2016 data showed that the concentration for vinyl chloride at wells UAW02-40 and UAW01-80 was 5.8 µg/l and 2.9 µg/l respectively while a concentration of 4.7 µg/l was reported for 1,1-dichloroethane at well UAW02-40. The 2016 data indicated that the concentration for arsenic in well UAW21-80 was 85 µg/l.
f) In addition to the mentioned contaminant sources from the northwest area, EPA has concerns with chromium as a prominent subsurface source of contamination at areas further upgradient from Mill Creek. The 2016 data indicated that the concentrations of total chromium in groundwater was 7,700 µg/l at well MW-EPA-4 within the central portion of the Site. As cited earlier, concentration for total chromium in well UAW-05-20

adjacent to Mill Creek was 4,500 µg/l. According to Table 5-7, Total Chromium vs. Hexavalent Chromium, Summary of Analytical Results, from the Facility Investigation (FI) Report, chromium was almost exclusively present in groundwater in valence form(s) different from that of chromium (VI). Although present in a less toxic form, concentrations of chromium in groundwater from the Site largely exceed WQC for total chromium at both near Mill Creek and further upgradient to the east and central portions of the Site. With respect to fate in groundwater, available monitoring data demonstrates minimal attenuation of chromium, remaining as a subsurface source of contamination with potential to migrate to Mill Creek. In terms of groundwater transport, the migration of chromium contamination from upgradient areas to Mill Creek is being largely slowed down by the heterogeneity and irregular saturation distribution in the upper aquifer at the Site. However, the 2016 data shows that the chromium source has reached well MW-EPA-4, advancing further downgradient towards Mill Creek. Subsurface source zones, such as the largely elevated chromium contamination in upgradient areas, can provide persistent loadings of contaminants migrating through groundwater to surface water in Mill Creek.

g) The Site can be redeveloped for industrial/commercial use based on restrictions as outlined in the site figure entitled Potential Institutional Controls, April 18, 2017. The Site can be redeveloped provided the redevelopment does not interfere with the existing groundwater recovery system or future final remedy to address groundwater contamination. Groundwater use will be prohibited for the site. In designated areas, use of existing buildings or new construction is allowed upon demonstration that concentrations of indoor air and/or soil gas are below vapor intrusion screening levels or upon installation of vapor intrusion mitigation systems.

Completion of Site Characterization

Below we are outlining information or clarification needs for the purpose of completion of the Site characterization. The outline also includes site characterization issues that are now resolved.

a) Please provide figures showing two dimensional iso-concentration contours for the groundwater contamination at the Site. Also, please consider providing additional figures based on the visualization modeling presented by Dow at our March 14 meeting, such as three-dimensional iso-concentration surfaces, lateral and vertical slices, and any other tools that may be helpful as visual displays of the lateral and vertical extent of groundwater contamination at the Site. The figures would help facilitate future discussions on the Site's Conceptual Model to support the Corrective Measures process.
b) The 2010 Baseline Risk Assessment (BRA) Report states that the fish ingestion pathway poses unacceptable risk due to arsenic in surface water. EPA has further evaluated the fish ingestion pathway evaluation from the BRA and determined that the carcinogenic risk for adult recreational fisherman has been overestimated. Please refer to Enclosures 1A and 1B containing an email from Bhooma Sundar, EPA toxicologist, with further details, including Fish Ingestion Risk Output. Dow should provide an addendum to the BRA based on the guidance provided in the cited enclosures.

c) EPA further evaluated the sediment data from Mill Creek available from the 2010 BRA and determined that several constituents of concern (COCs) exceed the Region 4 Ecological Screening Values (ESVs) and refined screening criteria (RSVs). These values are criteria based on lowest-observed-adverse-effect level(s). The COCs are: anthracene, benzo (a) anthracene, benzo (a) pyrene, chrysene, fluoranthene, fluorine, naphthalene, phenanthrene, 4,4'-DDE, and dieldrin. These exceedances indicate potential risks to the benthic community. However, based on our review of the Site history and related processes, the exceedances of COCs in sediment from Mill Creek appear to be unrelated to releases of hazardous waste from the Site. No further action is requested from Dow with respect to characterization of sediments from Mill Creek.

d) Based on the 2016 Site-Wide Groundwater Sampling Report, concentrations of several volatile organic compounds (VOCs) in groundwater exceed screening levels for vapor intrusion. The draft figure entitled Potential Institutional Controls, April 18, 2017, identifies those areas where the vapor intrusion pathway requires either deed restrictions or an evaluation prior to development of those areas of the Site. Please provide a plan and schedule for how you and QGPOH will address these areas and the deed restrictions relevant to protection from vapor intrusion as required for the Site in the figure entitled Potential Institutional Controls, April 18, 2017. The plan should also address vapor intrusion characterization work consistent with EPA's Final Vapor Intrusion Guidance if redevelopment, without deed restrictions for protection from vapor intrusion, is elected in certain areas presently identified as restricted due to vapor intrusion concerns.

e) Please provide a summary with an assessment of whether the information from the September 2004 FI Report, Table 5-7, Total Chromium vs. Hexavalent Chromium, Summary of Analytical Results, including laboratory analytical documentation, is consistent with current conditions related to chromium contamination in groundwater at the Site, Dow's explanation should account for the intervention of subsurface processes associated with oxidation of chromium (III) to chromium (VI).

f) Please provide a summary with an assessment on the extent of contamination in groundwater within the lower portion of the upper aquifer based on existing data for the Site. Dow's evaluation should identify potential migration pathways relative to areas within and outside the property boundary, including subsurface beneath Mill Creek. Dow may rely on the figures from earlier-requested submission as outlined in a) to assist with preparation of this assessment summary.

Next steps

Based on the above findings, EPA would like to move forward with the following next steps for Dow to ensure protection of human health and the environment, completion of corrective action and facilitate timely redevelopment of the Site.

- Provide the additional Site Characterization submissions as outlined in a), b), and d), e) and f) in this letter.
- Once the Site Characterization has been completed, the next steps in the Corrective Action process are the Corrective Measures Study and Corrective Measures Implementation, which

can be completed under a 3008(h) administrative order on consent. EPA has recently developed tools, collectively referred to as RCRA First, which aim to improve efficiency in the Corrective Action process. EPA would help facilitate the use of the RCRA First tools specific to the remedy selection process during these next steps if Dow is so inclined. Please refer to link https://www.epa.gov/hw/toolbox-corrective-action-resource-conservation-and-recovery-act-facilities-investigation-remedy. We look forward to negotiating with you.

Please provide the requested submissions within thirty (30) days of receipt of this letter.

For any questions regarding this letter, please contact me at (312) 886-7567 or at capiro.mirtha@epa.gov.

Sincerely,

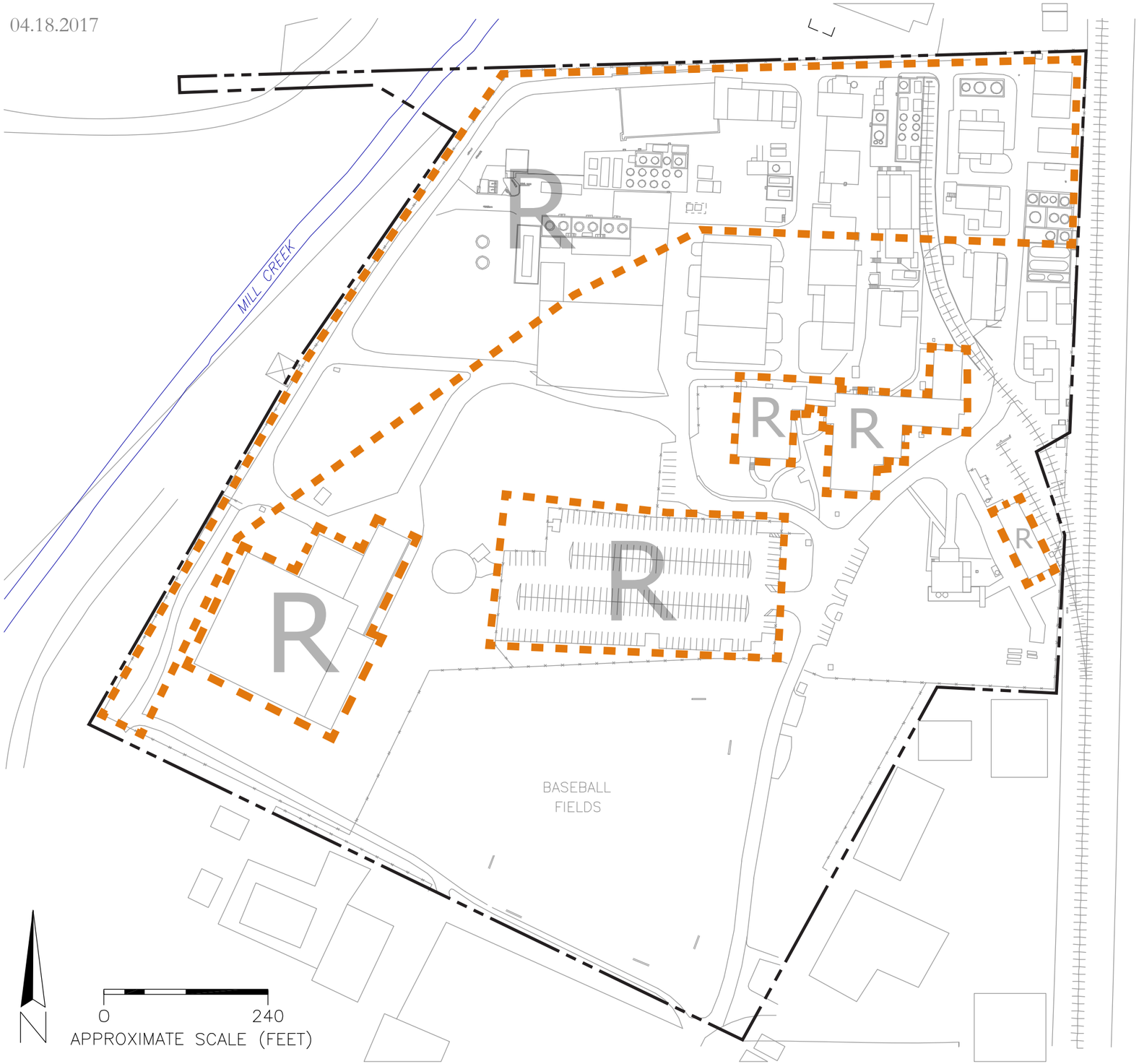
Mirtha Cápiro
Project Manager/Coordinator
Land and Chemicals Division
Remediation and Reuse Branch
Corrective Action Section 2

Enclosures:

Figure: Potential Institutional Controls, April 18, 2017
Enclosures 1A and IB: Email from Bhooma Sundar (EPA) to Mirtha Capiro (EPA) dated May 2, 2017, and Fish Ingestion Risk Output.

cc: Jacob Bamberger, QGPOH

04.18.2017



Rohm and Haas Site
Reading, Ohio
Potential Institutional Controls
EPA ID Number OHD 000 724 138

LEGEND*

Commercial/Industrial use that does not interfere with the existing groundwater extraction system or the EPA selected final groundwater remedy. Groundwater may not be used.

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Construction of new buildings or occupancy of existing buildings in these areas upon EPA approval of demonstration that sub-slab soil gas and/or indoor air concentrations are below EPA's Vapor Intrusion Screening Levels for industrial/commercial use or upon installation of mitigation systems (vapor barriers or depressurization systems).

Draft Document for Discussion Purposes

*Area outlines are approximate and are for discussion purposes only.

References:

1) Base map source: American Process Design Inc., 1998. Figure 2-2, Revised Facility Investigation Report prepared for Rohm and Hass Company by GEOMATRIX, September 2004;
2) Revised Baseline Risk Assessment by Parsons, October 2010;
3) 2016 Site-Wide Groundwater Sampling Report, Rohm and Haas Chemicals LLC by Parsons; and
4) EPA Vapor Intrusion Screening Levels: (https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-levels-visls).

Capiro, Mirtha

From: Sundar, Bhooma
Sent: Tuesday, May 02, 2017 2:14 PM
To: Capiro, Mirtha
Subject: Rohm and Hass BRA Conclusions
Attachments: Rohm & Hass Fish Ingestion Risk Output.pdf

Mirtha,

Parson submitted the revised Baseline Risk Assessment (BRA) report for Rohm and Hass chemicals, Ohio in October 2010. Based on the conceptual site model, the risk assessment evaluated the risk associated with all the potential exposure pathways for the receptors potentially in contact with all the impacted exposure media. The BRA report assessing human health risk concludes that except for fish ingestion pathway, all other exposure pathways pose no significant health risk to potential receptors. The following passage from Section 8.0 fo the BRA report states that fish ingestion pathway poses unacceptable risk due to arsenic in surface water.

"For the adult recreational fisherman, the hazard index (0.67) was below acceptable levels; however, the carcinogenic risk (1.2×10^{-4}) is above the acceptable levels, primarily due to the fish ingestion pathway. Therefore, exposure via ingestion of fish in the Mill Creek from fishing activities may result in an unacceptable cancer risk under the conditions evaluated for this receptor. The primary chemical of concern is arsenic. Arsenic was detected in only one duplicate sample in surface water; thus, the risk from this compound is likely overestimated based on this low frequency of detection and the utilization of the maximum detected concentration with conservative uptake parameters in the fish tissue modeling and because arsenic was detected at or below background levels in the surface water and sediments of Mill Creek. Thus, further evaluation of the fish ingestion pathway is not warranted at this time."

Since RCRA corrective action is focused on addressing the media that poses unacceptable risk, I evaluated the uncertainty discussion and the risk characterization methodology. My evaluation indicates that Parson, overestimated the carcinogenic risk for adult recreational fisherman. Using the constituents of concern(COC) identified in surface water and sediment (Section 4.3.1.7), exposure parameters (Table 4.14) and fish tissue COC calculations (table 11.3), the carcinogenic risk due to fish consumption is calculated to be 9.4 E-08 instead of 1.2E-04 as reported in the BRA report. The screening criterion for arsenic in fish targeting 1E-06 excess cancer risk is estimated to be 15mg/kg. Thus arsenic at a level of 1.08 mg/kg in fish from surface water contamination, does not pose unacceptable risk to adult recreational fisherman. Please see the attached output for the risk characterization of estimated COCs in fish for the ingestion pathway.

Please request DOW to verify the risk output and submit an addendum for the fish ingestion pathway risk characterization. This would help EPA to accurately present the risk estimates for the exposure pathways and propose cleanup measures where needed.

Bhooma Sundar
Project Manager/Toxicologist
RCRA Corrective Action (LU-16 J)
Land and Chemicals Division
USEPA Region 5
77, W. Jackson Blvd, Chicago, IL 60604
Tel: 312-886-1660

Site-specific

Fish Equation Inputs for Fish

ENCLOSURE 1B

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
AT (averaging time)	365
EF_{res-a} (exposure frequency) days/yr	20
ED_{res} (exposure duration) yr	26
LT (lifetime) yr	70
BW_{res-a} (body weight) kg	80
IRF_{res-a} (fish consumption rate) mg/day	228

Output generated 24APR2017:11:06:59

Site-specific

Fish Screening Levels (RSL) for Fish

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	CAS Number	Mutagen?	VOC?	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Ingestion SL TR=1.0E-6 (mg/kg)	Ingestion SL THQ=1 (mg/kg)	Screening Level (mg/kg)
Arsenic, Inorganic	7440-38-2	No	No	1.50E+00	I	3.00E-04	IR	1.15E+01	1.92E+03	1.15E+01 ca
Copper	7440-50-8	No	No	-		4.00E-02	HE	-	2.56E+05	2.56E+05 nc
Dichlorobenzene, 1,2-	95-50-1	No	Yes	-		9.00E-02	IR	-	5.76E+05	5.76E+05 nc
Zinc and Compounds	7440-66-6	No	No	-		3.00E-01	IR	-	1.92E+06	1.92E+06 nc

Site-specific

Fish Risk for Fish

Chemical	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Concentration (mg/kg)	Ingestion Risk	Ingestion THQ=1
Arsenic, Inorganic	1.50E+00	I	3.00E-04	IR	1.08	9.40E-08	5.62E-04
Copper	-		4.00E-02	HE	1.34	-	5.23E-06
Dichlorobenzene, 1,2-	-		9.00E-02	IR	0.79	-	1.37E-06
Zinc and Compounds	-		3.00E-01	IR	23.1	-	1.20E-05
**Total Risk/HI*	-		-		-	*9.40E-08*	*5.81E-04*